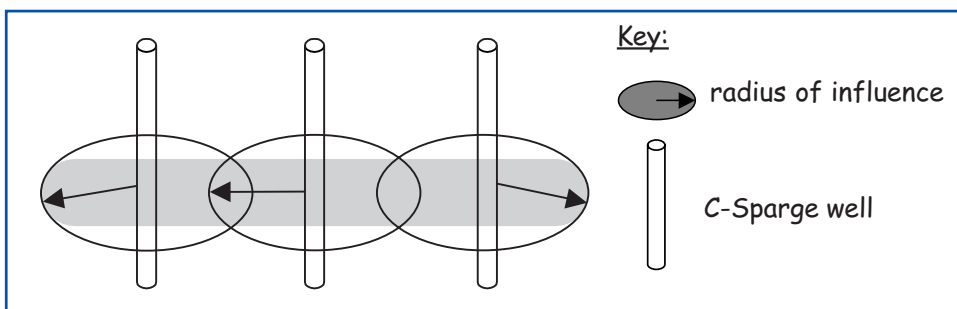


Oversight News

Newsletter of the Commonwealth's Environmental Oversight of the Paducah Gaseous Diffusion Plant

DOE Moves Forward with C-Sparge™ Treatability Study

On April 25, 2002 DOE submitted a plan to the Kentucky Division of Waste Management and the U.S. EPA that outlines the installation and testing of an innovative groundwater remediation technology. The technology, called C-Sparge™, involves placing a well or series of wells into the Regional Gravel Aquifer and injecting ozone into the contaminated groundwater near the bottom of the aquifer. The ozone (which is simply three oxygen atoms that form a single O₃ molecule) would be injected in the form of small bubbles through what are called Spargepoints®. Once injected, these small bubbles



Although all areas inside a well's radius of influence are treated, overlapping the radius of influence from each C-Sparge well forms a continuous treatment zone (the shaded area). Drawing not to scale.

will act to strip trichloroethene (TCE) vapor out of the groundwater. The TCE will then enter the ozone bubbles and react with them to form water (H₂O), carbon dioxide (CO₂), and chloride ions (Cl⁻), effectively destroying the TCE.

In addition, an ion exchange canister will be installed inside the C-Sparge well. Driven by an in-well pump, groundwater will circulate through the canister, which will act to remove technetium-99 from the groundwater.

The purpose of this treatability study is to determine whether a series of C-Sparge wells could be used to form a "bubble curtain" that would intercept the dissolved groundwater contamination just before it migrates off site. Such a curtain potentially could be used to prevent further impairment of groundwater quality north of the

plant. To use the wells in this way, it is critical to first determine each well's radius of influence once installed in the Regional Gravel Aquifer. It's estimated that each well may be able to remove contamination from groundwater up to 50 feet away from the well. However, until the radius is known with some certainty, it will be difficult to determine how far apart to space each well in the curtain in order to form a continuous treatment zone (without gaps). This is one of the critical pieces of information the study should provide.

The C-Sparge treatability study will involve a single well installed near the northwest corner of the C-752-A Building. This location was selected primarily because it places the well in the heart of the Northwest Plume. By placing the well in an area with high levels

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Report on Scrap Yard Mammals Released

DOE has released a report detailing the results of its study of scrap yard mammals. Last year, DOE completed a weeklong collection of mammals using or living in the 60-acre scrap yard area in the northwest corner of the Paducah plant. The project's purpose was to identify contamination levels in these mammals. There were also concerns that wildlife displaced during scrap metal removal, scheduled for this year, would carry contamination to areas outside the plant's security fence.

The study collected a variety of mammals: a rat, rabbit, mice, voles, shrews, raccoons, opossums, groundhogs and bobcats. The whole body of each small mammal (mouse, vole and shrew) was analyzed for polychlorinated biphenyls (PCBs), percent lipids, metals and radiological parameters. Tissues such as liver, kidney and fat were analyzed from the medium-to-large-sized mammals.

The other agencies involved in the project—including the Kentucky Department of Fish and Wildlife Resources, U.S. Fish and Wildlife Service and Kentucky Division of Waste Management—were not involved in the document review process before the report's release last November. As a result, the DOE report was released to the public with some inaccurate information in the description of agency roles and

responsibilities, and in particular assumptions that had no cited scientific foundation.

Data indicated that mammals collected from the scrap yards had tissue contaminated with metals such as cadmium, uranium and lead; PCBs; and radionuclides such as technetium-99 and uranium-238. Technetium-99 was found in white-footed mice from both the scrap yards and the control site, Metsger's Pond in the West Kentucky Wildlife Management Area. The average technetium-99 level in the scrap yard mice



was about 2.5 times that of the control site. PCBs in scrap yard mice averaged over 9 parts per million.

However, not all results followed a consistent pattern. Some elements were as high or higher in control site mammals compared to those from the scrap yards. This was especially true for the shrews. Thorium-228, chromium, manganese, arsenic, lead, iron and aluminum levels in control site shrews exceeded the levels in scrap yard shrews. Arsenic in control site shrews was up to five times higher than levels in scrap yard shrews. Likewise, prairie voles

from the two sites showed similar irregularities for cadmium and barium.

The level of technetium-99 found in mice from the control site was unexpected and cause for concern. Technetium-99 came to the facility as a byproduct in uranium feed material and, except for its presence in a groundwater plume, is expected to remain in the immediate area of the plant. Its discovery in control site mice suggests that Metsger's Pond may not have been an appropriate control site to compare with areas of known contamination.

The project met its goal of identifying contaminant levels in scrap yard mammals, and the results suggest negative impacts to the food web. Certain contaminant concentrations can build up in body tissues over time, even though exposure levels may be low. Concentrations can also be magnified as the contaminant moves through the food web via predator/prey interactions. These occurrences—called bioaccumulation and biomagnification, respectively—pose a serious threat to wildlife.

Wildlife have easy access to the scrap yards, and it was not known if collected animals lived in the scrap yards or were there only to feed. The question of whether scrap removal would facilitate the movement of contaminants to areas outside the

Storm Water Basin Nears Completion

Rainy spring weather has hampered completion of the sedimentation basin for the scrap metal removal project, although work continues. The basin is needed to control and limit the flow of contaminants from the scrap metal yards into Outfall 001, a point of discharge into Bayou Creek. The basin will collect rainfall that runs off the scrap yards and picks up potentially contaminated sediments.

The north end of the basin is in good shape, and contractors are building forms for pouring the concrete that will make the spillway. All of the clay along the sides and bottom of the basin is in place, and the impermeable liner has been installed. Utilities installation is about 90 percent complete, with electrical utilities lacking only the final tie-in. The basin's recirculation pumps are in place and associated piping is installed, but not yet pressure tested. The security fence around

the basin is 50 to 60 percent complete.

In the northwest portion of the plant, the ditches that drain the



Contractors install the basin's impermeable liner of high-density polyethylene (HDPE).

Photo by Gaye Brewer, Ky. Division of Waste Management

scrap metal yards are being regraded to flow toward the basin. Ditches in the remainder of the Outfall 001 watershed are being regraded to flow away from the basin into other areas of the Outfall 001 ditch. Although it was affected by the rainy weather, the work was able to continue and is now 90 to 95 percent complete. The concrete, culverts and catch basin south of the C-746-B waste storage building, as well as culverts under the fence and west patrol road, are still under construction.

By Gaye Brewer, Ky. Division of Waste Management, Hazardous Waste Branch

Scrap Yard Mammals

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facility via contaminated wildlife could not be answered. Results from the control site samples support previous findings that contaminated wildlife already exist outside the plant's security fence.

By Janet Miller, Ky. Division of Waste Management, Hazardous Waste Branch

New Wells Installed to Monitor Landfills

DOE has completed the installation of a new 21-well groundwater monitoring system at the C-746-U solid waste landfill. In May 2000, corrosion was discovered in the ten stainless steel wells that made up the landfill's previous compliance monitoring network. Concerned that the corrosion could affect the reliability of data collected from the wells, the Kentucky Division of Waste Management shut the landfill down on August 10, 2001.

The new wells must be developed and sampled on two

separate occasions, at least 30 days apart, before the division can consider allowing the landfill to receive wastes again. All of the original wells have been abandoned.

Corrosion had also been discovered in monitoring wells for the nearby C-746-S and -T landfills. The S and T landfills have reached their capacity and no longer accept wastes, but under the facility's solid waste permit are required to monitor groundwater. DOE recently completed replacement of those wells.

Information provided by Todd Mullins and Tony Hatton, Ky. Division of Waste Management, Hazardous Waste Branch

Time-Critical Removal Action Approved

On March 20, 2002 the Kentucky Division of Waste Management granted final approval of the Department of Energy's (DOE) plan to clean up an area of petroleum-contaminated soils in SWMU 193, a large solid waste management unit in the southeastern portion of the plant site. The petroleum spills were discovered August 8, 2001 when workers noticed stained soils and a strong petroleum odor during excavation work to renovate two cylinder yards. Construction was halted and plans were made to remove the contaminated soil.

DOE sampled a large area in order to determine the horizontal

and vertical extent of the petroleum spills. The sampling indicated that the contamination was confined to a 40-foot by 40-foot zone in the northeastern corner of the C-745-M cylinder yard.

Excavation and removal of the contaminated soil took place in late March 2002. The eastern side of the square-shaped contamination site was excavated down to a depth of one foot, sampled, and subsequently determined to be clean. However, the western half of the site was contaminated. Soil needed to be excavated down to depths of five to eight feet to remove all of the

detectable petroleum from the area.

Now that the contaminated soils have been removed, DOE can move forward with plans to renovate the C-745-M cylinder yard. The renovation will involve removing additional soil and gravel from the area and pouring a thick concrete pad that will serve as a storage area for numerous depleted uranium hexafluoride cylinders. DOE is required to replace all old gravel-covered cylinder yards with concrete yards, which are considered safer for cylinder storage.

By Todd Mullins, Ky. Division of Waste Management, Hazardous Waste Branch

Trestle Repair

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certification from the state. The Kentucky Division of Water (DOW) required USEC to apply for a 401 Water Quality Certification since the trestle repair would require significant work in the stream.

Concerns about the potential for sedimentation prompted DOW's Water Quality Branch to request a new work plan from USEC. USEC's new plan proposed to divert the stream with sandbag dams and a 6-inch intake line to pump the water around the work area. On-site AIP personnel assisted DOW by

investigating the proposed work site, collecting stream width and depth measurements and digital photographs and reviewing



Contractors install an intake pipe to route Bayou Creek around the work area.

Photo by Trent Griffin, courtesy of USEC

sediment data.

DOW approved the 401-certification on March 18, and USEC began work on April 1.

AIP staff monitored the work throughout the weeklong project. The project hit one snag when the dirt road parallel to the creek began to give way under the weight of the trucks that had been delivering loads of riprap. The soft earth was dug out from the road, replaced with riprap and finished with hard-packed gravel.

By Janet Miller, Ky. Division of Waste Management, Hazardous Waste Branch

Construction Projects Successful

Bridge Repair

The Department of Energy (DOE) has replaced the low-crossing bridge over the unnamed tributary of Bayou Creek. Located southwest of the plant on Rice Springs Road, the bridge is a direct route to the L.M. (Tony) Anthony Fishing Lake, a 5-acre pond of the West Kentucky Wildlife Management Area. The lake is equipped with a wheelchair-accessible ramp and is a favored fishing spot.

DOE asked its contractor Bechtel Jacobs to inform the state's on-site Agreement In Principle (AIP) personnel of the work to be performed so that AIP could consider potential impacts to the stream. AIP's review of the work plan resulted in a change that was more protective of the stream.

The original work plan called for removing creek bank soil to construct temporary dams, which were necessary both up- and downstream of the bridge in order to make the repairs. AIP was concerned that the removal of bank soil would increase the erosion potential, and negatively impact stream organisms and bank vegetation. Even if the soils were replaced later, the root masses that had once held the soil in place would have been destroyed, leaving the bank unstable. Contractors agreed to instead remove soil from a nearby location that would not contribute sediment run-off to the creek.

Bridge repair included the complete removal of the four corrugated steel pipe culverts that were 36 inches in diameter and 20 feet long. These were replaced with two aluminized steel elliptical culverts, 28 feet in length with a diameter of 83" x 56". Hal Hempen, project manager for the bridge replacement work, explained that the elliptical shape of the culverts gives the desired height with an increased volume capacity, allowing better water flow.

Also, steel trash screens were placed over the ends of the culvert pipes to prevent large branches and dead trees from getting stuck in the pipes, obstructing flow, and causing water to back up and wash out over the bridge. The screens, actually more rod-like than screen-like, are wide enough to allow the unrestricted movement of animals, water and small debris.

Work was completed in about six weeks and the bridge reopened on April 1. The estimated repair time was four weeks, but a particularly wet month in March (more than seven inches of rain) caused unexpected delays. The new bridge underwent an early test when the local area received over six inches of rain in the month following its reopening. It passed with flying colors.



The new bridge, seen here during construction, features elliptical culverts, a design improvement.

Photo by Janet Miller, Ky. Division of Waste Management

Railroad Trestle

A second recent project involved the repair of a railroad trestle across Bayou Creek. The rail bridge is located southwest of the plant between Outfall 009 and the closed C-746-K landfill.

The United States Enrichment Corp. (USEC) was responsible for the repair work, which involved excavation from under

the right footing of the trestle and concrete reinforcement of the footing to restore stability. Auxiliary work included regrading the bank on either side of the trestle and minimizing erosion of the graded area with geotextile fabric and riprap (a covering of stones designed to protect erodible areas).

Before work could begin, applicability of the Clean Water Act had to be considered. Section 401 of the act, which deals with the discharge of dredged or fill material, is an important federal statute that a state can use to ensure protection of its waterways. In lay terms, it states that any applicant for a federal license wishing to conduct activity that may result in any discharge into navigable waters shall provide

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Natural Resources and Environmental Protection Cabinet
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Division of Waste Management
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C-Sparge™

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of groundwater contamination, it's hoped that any effects the C-Sparge system might have on the contamination will be readily apparent. The test is tentatively scheduled to begin in the fall and last about 30 days.

By **Todd Mullins**, Ky. Division of Waste Management, Hazardous Waste Branch

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The ***Kentucky Environmental Oversight News*** is published quarterly by the Kentucky Department for Environmental Protection's Division of Waste Management. It features information regarding environmental remediation activities at the Paducah Gaseous Diffusion Plant site and related topics. Subscriptions are free and may be requested from Lauren McDonald (newsletter editor), Hazardous Waste Branch, Division of Waste Management, 14 Reilly Road, Frankfort, KY 40601 (502) 564-6716, FAX (502) 564-2705.

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